# GOOD PRACTICES IN SME

## Installing recuperators in kilns

*Designed by freepik*

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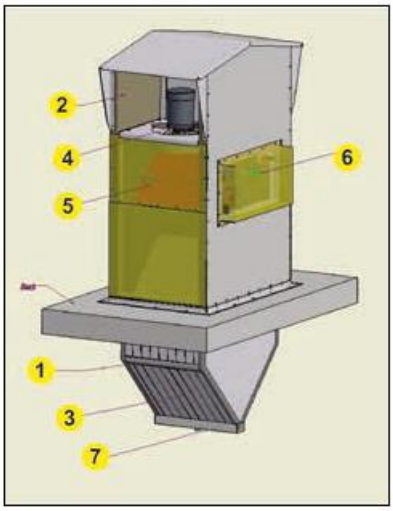
## What are recuperators used for?

Recuperators or recuperating chimneys are used for air exchange during the drying process with the aim of recuperating or recovering heat from exhaust air and using it to heat the air in the kiln. It is a integrated, independent appliance built into the kiln's roof. The installation has two channels and depending on the direction of air circulation within the kiln chamber, they alternate the roles of the supply and exhaust channels. The most important element of the recuperator is the counterflow heat exchanger which recuperates heat energy.

*Pic. 1 drewnolandia: wood kiln*

## Why are recuperators cost-effective?

Using a recuperator allows for up to 35% of heat energy savings (real savings of about 18%).




1. zespół wymiennikowy
2. zespół regulacyjny
3. przeciwprądowy wymiennik
4. wentylator osiowy rewersyjny
5. przesłony (sterowane siłownikiem, służą do regulacji natężenia przepływu powietrza)
6. siłownik elektryczny obrotowy
7. zbiornik

*Pic. 2 hamech: construction of a recuperator*
*1. Exchanger unit, 2. Regulator circuit, 3. Counterflow exchanger, 4. Reversible axial fan, 5. Shutters (actuator controlled, used to regulate air flow, 6. Rotary actuator – electric 7. Container*

## Effects of an example investment

An analysis of energy consumption and an audit of each technological process, appliances and equipment was conducted in one of the audited enterprises to verify the possibility of improving energy efficiency by installing recuperators. The audited company deals with processing timber from certified forests. The company has its own kiln yard, production plant and a indoor warehouse. The company also uses two chamber kilns, models SK-144 and SK-179. They allow for the full automation of kiln drying of different types of wood. They two kilns have an average heating power of 200kW, and 235kW respectively. The two kilns are heated by a 500kW boiler fired with sawdust and wood chips (production by-products).

The fuel and energy consumption of the enterprise is presented in the table below.

*Table from top left to bottom right:*
*x-axis:* ***Energy carrier, Consumption: Amount, Unit, Amount [kWh/year], Total share***
*y-axis: Electricity, Sawdust, Oil, Natural Gas,* ***Total***
*Units: stere/year, $m^3$/year, 11kg canister/year*

| Nośnik energii | Zużycie | | | Udział w całkowitym zużyciu |
|---|---|---|---|---|
| | Ilość | Jednostka | Ilość [kWh/rok] | % |
| Energia elektryczna | --- | --- | 320 833,000 | 16% |
| Trociny | 1 600 | $m_p$/rok | 1 345 067 | 68% |
| Olej napędowy | 30 | $m^3$/rok | 305 468 | 15% |
| LPG butle | 100 | butli 11 kg/rok | 14 040 | 1% |
| Suma | --- | --- | 1 971 368 | 100% |

Possible energy efficiency improvement and the estimated savings and cost:

*Table from top left to bottom right:*
*x-axis:* ***Action, Annual energy savings [kWh/year], Estimated cost [PLN gross], SPBT [years]***
*y-axis: Installing recuperators for the SK kilns*

| Działanie | Roczna oszczędność energii [kWh/rok] | Szacowany koszt [zł netto] | SPBT [lat] |
|---|---|---|---|
| Montaż kominów rekuperacyjnych suszarni SK | 749 093 | 40 800 | 1,68 |

*Source: KAPE*